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Economic growth and disparities: an empirical analysis for the Central and Eastern European countries

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Abstract
Research background: The processes of economic convergence observed in many developing countries are characterized by reduction of economic differences on the cross-country level, which are accompanied by growing internal economic inequalities. This may stem from the fact that in the catching-up countries, a more dynamic growth pattern is observed in the economically strongest regions, which is initially reflected in spatial polarization and increasing regional inequalities. However, just as the countries reach higher levels of development, the diffusion of growth-inducing impulses to less-developed areas should lead to the spatial equalizing of the development levels and reducing regional inequalities.
Purpose of the article: The aim of the paper is to determine the relationship between the level of economic growth and observed economic inequalities in Central and Eastern European (CEE) countries. The theoretical framework adopted to describe and explain those relations is the so-called Williamson's hypothesis in which the relationship between the scale of regional inequalities and economic growth is illustrated by a curve shaped like an inverted U.
Methods: The research procedure was intended to verify Williamson's hypothesis by estimating parabolic econometric models. Indicators of economic growth along with measure of

regional inequalities (Williamson's coefficient of variation) were used in the regression modeling. The research period spanned the years 1995-2014.
Findings & Value added: In the light of the study of CEE countries, it was possible to observe both convergence symptoms as well as divergence tendencies. It can be thus stated that the analyzed CEE countries followed a similar path to the one observed earlier by Williamson in other developing countries. However, the analyses conducted by the authors at the national and regional levels of CEE countries were equivocal and did not fully support the theoretical assumptions of Williamson's hypothesis.

Introduction

The dynamics of spatial economic inequalities has long been of interest to economists endeavoring to identify tendencies and explain mechanisms of convergence or polarization of state or regional economies. The issue of economic convergence or divergence although commonly addressed in empirical verification procedures initiated by Barro and Sala-i-Martin (1991, 1992), still gives rise to controversy and basically remains unsolved. Supporters of the convergence hypothesis argue on the basis of neoclassical growth models that countries (regions) with lower per capita GDP usually achieve higher rates of economic growth, which leads to a reduction of economic disparities (Barro, 1991). On the other hand, equally popular are the post-Keynesian concepts, which stipulate that economic growth is a spatially cumulative phenomenon (Myrdal, 1957). This means that rich countries or regions, thanks to accumulated capital and access to resources, attract additional business activities, thus diminishing the possibilities of economic growth for underdeveloped areas. Although the latter can benefit from the spillover effect (i.e. growth impulses induced by expansion of the thriving economies), the benefits may be upended by the backwash effects (negative economic effects inhibiting growth, such as the drain of workforce, loss of capital, products, and services to the rich countries or regions). These processes tend to lead to an increase in economic inequalities, which is often referred to as economic divergence (Rodríguez-Pose, 1999; Petrakos *et al.*, 2003; Barrios & Strobl, 2009).

The heated scientific debate that has existed for years becomes even more perplexing as some research findings indicate that both short-term divergence and long-term convergence processes coexist (cf. Petrakos *et al.*, 2003). This situation may stem from the fact that in developing countries a more dynamic growth pattern of economically strongest regions can be observed, which is initially reflected by spatial polarization and increasing regional inequalities. However, with time, as the economies are upgraded to higher levels of growth, the processes of growth impulse diffusion to

other areas should result in spatial equilibration of growth levels and a decrease in regional disparities.

In this context, the aim of the paper was defined as determining the relationship between the level of economic growth and trends in economic disparities in Central and Eastern European (CEE) countries[1]. The theoretical framework adopted to describe and explain those relationships was Williamson's hypothesis (1965), in which the relationship between the scale of regional inequalities and economic growth is illustrated by a curve shaped like an inverted U. The research procedure was intended to verify this hypothesis by estimating parabolic econometric models. The time series of the study covered the period between 1995–2014 (analysis on the state level) and 2000–2014 (analysis on the regional level). The time span was determined by the availability of statistical data.

The verification of the dependence of regional inequality on economic growth was addressed in many other studies undertaken mainly on the basis of the EU countries. However, the results were mostly ambiguous, leading to the conclusion that Williamson's hypothesis is not a one-size-fits-all theory on economic inequalities. The dynamically changing economic environment of the CEE countries after accession to the EU, legitimizes research on the above-mentioned relationships, and the conducted analysis may contribute to the discourse in the literature.

In the paper, the assumptions of Williamson's inverted-U hypothesis were presented, and the existing body of literature concerning previous research was reviewed. Furthermore, a research procedure was proposed for validation of Williamson's hypothesis by means of econometric modelling and the results were presented in two parts covering: (1) CEE countries as a group, and (2) individual CEE national economies.

Williamson's hypothesis of an inverse U-shape curve

The first attempts to identify patterns in economic inequality were based on research concerning households' income distribution. One of the most widespread prognoses of this type was formed by Kuznets (1955) who identified a link between the level of inequality in the allocation of income between citizens, and the level of economic growth. The results of his research showed that this graphic representation of the economic interdependence was

[1] The analysis covered the CEE countries that joined the EU in 2004 or later (Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia).

bell-shaped. In the early phase of a country's economic growth process (during industrialization and urbanization of agricultural societies) the disparities increased, then they leveled out to be considerably reduced in the maturity phase of well-developed industrialized economies (see e.g. Barrios & Strobl, 2009; Piketty, 2015).

The spatial dimension of the interdependency described above was introduced by Williamson (1965), who had thoroughly investigated the empirical validity of Kuznets' curve. On replacing the measure of personal income diversity with regional inequality rate, he observed that the regional differentiation was higher in underdeveloped countries, and lower in well-developed countries. Furthermore, he noted that, with time, regional inequalities in the first group of countries increased, while in the second group of countries — they tended to decrease. As a result, he argued that there was a link between regional convergence and divergence processes, and the phases of economic growth of the country, and described the relationship with an inverse U-shape curve (see Figure 1).

In the initial phases of growth of a national economy, interregional differences increased while in the subsequent stages interregional convergence occurred. Such interdependency was explained by the fact that in underdeveloped countries there were few regions that boasted the characteristics of the so called "growth poles". In these areas, due to a high concentration of production factors and better technical equipment, one could observe growing productivity and an increased pace of development in comparison to other regions of a country. Along with the national growth though, more and more regions gained access to growth factors, such as capital, technology, and new markets. This could have been due to the growing production cost and increasing barriers to growth in well-developed regions (e.g. access to infrastructure and public utilities, environmental pollution, lack of new land for development), which were accompanied by growing production factors including mobility, knowledge and technology diffusion, as well as peoples' attitudes resulted in placing investments in underdeveloped regions. Exceeding the growth threshold by underdeveloped regions triggered convergence processes in the economy structure, workforce efficiency, and income per capita (Wang & Ge, 2004; Szörfi, 2007; Barrios & Strobl, 2009).

Williamson (1965) emphasized the two development gaps characteristic of developing countries. The first referred to the differences in the level of growth of a country in comparison to well-developed countries. The second reflected the internal economic inequalities observable within the catching-up country. According to the mechanism explained by Williamson's hypothesis, achieving the cross-country convergence entailed an increase in

regional disparities in the initial phase, and an internal development gap was levelled out and regional cohesion obtained only in the long run.

Literature review

There is a large body of literature, mostly international and national studies that demonstrate the effect of convergence on individual countries, while the regional perspective has been analyzed less frequently. Little attention has been paid to internal disparities within countries and the differences in the pace of regional development. Among the studies that tackle the neglected connection between regional inequalities and economic growth is the one by Szörfi (2007), who examined the relationship between regional inequalities and the development of states in the enlarged European Union. By applying panel data methods, the author proved Williamson's curve hypothesis showing that disparities were lower in the early phases of development, peaked in middle-income periods, but diminished again when a nation became well-off. Furthermore, it was emphasized that several other factors had affected economic disparities more than national income, i.e. the date of EU accession, the economic transition process in the new Member States, Economic and Monetary Union, as well as the funds made available by the EU Structural and Cohesion Funds.

A similar study was conducted by Davies and Hallet (2002), who scrutinized four selected cohesion countries (Greece, Portugal, Spain, and Ireland) and three well-developed states (Germany, Italy and the UK) in the EU between 1980–1999, and tested the relationship between regional disparities and development against Williamson's curve. The authors proved a strong correlation on the ascending side of the curve (the disparities were escalated as the process of catching-up was driven by several growth poles leaving the other regions lagging behind), and a weak relationship on the descending side. The authors suggested that policy-makers should facilitate stronger national growth by focusing public investment on the growth poles in the early stages of catching up, and by encouraging a more dispersed pattern of economic development in later stages. Such a conclusion was also reached by Petrakos *et al.* (2003), who proved that regional long-term proactive policies fostered a more equal allocation of activities and resources. The authors reported regional inequalities to be the net outcome of two contrasting dynamics: a pro-cyclical pattern with dynamic and developed regions growing faster in periods of expansion and growing slower in periods of recession, and a long-term spread effect.

A different approach was presented by Dall'erba and Le Gallo (2008), who broadened their study to 12 countries (the EU–15 excluding Austria, France, and the UK) between 1989 and 1999. They focused on inequalities within the EU, dividing the EU into core regions (in more developed countries) and periphery regions (usually in less developed countries). The findings were equivocal. They observed significant convergence among the peripheral regions. Furthermore, the authors explained that the spillover effects emerging from the EU's structural funds' impact occurred only in the core regions — usually smaller, and better linked to each other through trade and transportation networks. Similar findings were presented by Brasili and Gutierrez (2004), whose study covered 15 EU countries between 1980–1999. The application of distribution dynamics and panel data analysis allowed for a positive verification of the convergence hypothesis. They found clear evidence that per capita income levels in developing countries would converge toward the mean and that the process was more intense among low-income regions.

Research methodology

Testing of Williamson's hypothesis was conducted by means of econometric modeling. The spatial scope of analysis covered Central and Eastern European countries (CEE) that joined the EU in 2004 or later (Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia).

At the first stage, the link between the economic growth and disparities at the intercountry and cross-regional level in the CEE countries was examined. Subsequent intra-country analyses were then conducted in terms of changes in inequalities within individual CEE national economies.

The research started with the selection of variables representing the level of economic growth of countries and their regional disparities (on the state and regional NUTS 3 level). The statistical data on the economic growth of countries and regions (GDP per capita) was obtained from the Statistical Office of the European Union (Eurostat). A version of the rate based on purchasing power standard (PPS) was used, which facilitated intercountry comparison with respect to the level of real income.

As a measure of between-country and intra-national economic inequality, a weighted coefficient of variation V_W was adopted after Williamson (1965):

$$V_W = \frac{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2 \frac{l_i}{L}}}{\bar{x}}, \quad (1)$$

where:
x_i – GDP per capita (in PPS) of the i^{th} country (region),
$\bar{x}$ – average GDP per capita (in PPS) calculated for all analyzed countries (regions),
l_i – population of the i^{th} country (region),
L – total population of all analyzed countries (regions).

Due to the parabolic shape of Williamson's inverse curve, in the course of the research, parameters of the second degree polynomial were estimated, using the following analytical form of the regression function:

$$y_t = b_0 + b_1 x_t + b_2 x_t^2 \ (b_2 \neq 0).$$

This means that Williamson's coefficient of variation in year *t* (dependent variable *y*) was explained by the quadratic function of GDP per capita in selected units in year *t* (independent variable *x*). The estimation of regression equation parameters was done by the ordinary least squares method, according to the rules developed for linearized models with respect to parameters.

The verification of Williamson's hypothesis showed the analysis of configuration of points in scatterplots (spot charts depicting pairs of analyzed variables in subsequent years). It also embraced testing the values and statistical significance of the estimators of the regression function parameters. When the estimator b_2 was negative and statistically significant, the function had an inverse U shape, which was in line with Williamson's hypothesis. In any other case, ($b_2 > 0$ and statistically significant), the chart was U-shaped. The lack of statistical significance of the estimate of parameters indicated the incorrect analytical form of the model.

Research findings: cross-country and cross-regional evidence

The analysis showed that in the analyzed period, the level of economic development of the CEE countries approached the level that had been previously reached by EU–15 countries (member countries in the *EU* prior to the accession of ten countries in 2004). Between 1995–2014, the average annual growth rate of GDP per capita in the countries surveyed was 5.5%,

whereas in the EU–15 it was a meager 2.8%. In the first year of analysis (1995), GDP per capita in CEE accounted for only 37% of the EU–15 average. By 2014, this relationship increased to 61% (see Figure 2).

These results demonstrated that the CEE countries entered the path of external convergence with the countries of the "old" Union. The systemic transformation and EU membership entailed reducing the development gap at the national level. As a result, in the next part of the study, the authors examined whether the intercountry convergence behaved in accordance with the mechanism described by Williamson.

The regression modeling aimed at determining the statistical parameters of the relationship between the economic growth and disparities and verifying Williamson's hypothesis were carried out for the CEE countries first on the national level, and then at the NUTS3 level.

During the time period under analysis, CEE economies continued to increase (from 6.6 to 18.3 thousand PPS). Along with the economic growth, the disparity between the countries surveyed declined substantially. Williamson's coefficient decreased from 0.3 in 1995 to 0.15 in 2014 (see Figure 3). At the beginning of the analyzed period, the variation value was stable, oscillating around 0.3. In 2001, it started to decline. Certain deviations from the prevailing downward trend were identified in connection with the economic crisis that began in 2008. The economies of the surveyed countries responded differently to the global recession. Large decreases in economic activity were noted in the Baltic States (Estonia, Latvia, Lithuania), and the least downturn was observed in the Czech Republic and Hungary. In Poland, the increase of GDP per capita remained relatively unimpeded.

The obtained statistical data allowed for estimation of the parabolic regression function opening downwards ($b_2 < 0$) as shown in Figure 3. The coefficient of determination for the estimated model was 0.97, indicating a very good match between empirical data and data obtained from regression function. The estimation of parameter b_2 was statistically different from zero (p-value = 0.0025). Thus, it was possible to validate Williamson's inverse U hypothesis on the relationship between the economic growth and intercountry disparities.

A contradictory picture emerged under the analysis of the relationship between the economic growth and inequalities at the NUTS3 level (see Figure 4). First of all, a significantly higher level of economic inequalities was identified (Williamson's coefficient reached values from 0.62 to 0.64). At the same time, a growing diversification of economic growth at the regional level was observed.

The estimated econometric model of the tested relationship at the NUTS3 level was not well-matched to the empirical data, since it explained only 58% of the regional variation. The regression coefficients, although pointing at the parabola opening to the bottom, were not statistically significant. It was assumed that the tested relationship could not be described by a quadratic function, and thus Williamson's hypothesis could not be positively verified at the NUTS3 level.

The reason for this situation (lack of statistical significance of the independent variables) could be due to a relatively short period of time for the analysis. It was assumed that the estimated models with data covering subsequent years (2014+) would be eligible for inference concerning the nature of the relationship subject to the authors' deliberations.

The growing regional disparities stemmed primarily from the above-average growth rates recorded in metropolitan regions often comprising national capital cities that remained beyond the reach of other regions. The more economically active regions boasted of the highest demographic and socio-economic potential and as such benefited most from the development impulses emerging after the period of political transformation in CEE. However, as the so-called diseconomies of scale emerge and the conditions for diffusion of growth impulses occur, further income growth in well-developed regions no longer outperform growth in other regions. This situation may be interpreted as a symptom of the relationship described by Williamson's inverse U-shaped curve.

Research results: intra-country evidence

In each of the 11 analyzed CEE countries, convergence tendencies occurred, meaning the growth of national economies approached the level of the "old" EU countries (cf. Table 1). Among the most developed countries surveyed was the Czech Republic, whose per capita GDP accounted for 80% of the EU–15 average, Slovenia (76% of the EU–15 average), and Slovakia (71% respectively). Relatively lower (not exceeding 60% of the EU–15 average) values were recorded in Latvia (58%), Croatia (54%), Romania (50%), and Bulgaria (43%). The highest increases in the period 2000-2014 were observed in the Baltic countries — Lithuania, Estonia, and Latvia (+36, +32, and +27 percentage points respectively), Slovakia (+29 pp), and Romania (+29 pp). The lowest changes were observed in countries that in the first year of analysis were characterized by the highest growth level, i.e. in Slovenia and the Czech Republic (increase by +8 and +18 pp

respectively), but also in less developed countries — Croatia (+12 pp), Hungary (+17 pp), and Bulgaria (+19 pp).

At the same time, growing dispersion of the regional levels of economic growth was identified. Williamson's coefficients V_W were, as a rule, increasing in each of the analyzed countries, yet there were also some, which leveled out after the initial growth phase, or even diminished. In 2014, the highest level of regional inequalities was found in Bulgaria and Romania (V_W = 0.83 and 0.71 respectively) and the lowest in Lithuania, the Czech Republic and Slovenia (V_W = 0.44, 0.43 and 0.33 respectively). Furthermore, Bulgaria and Romania saw the highest increase in inequalities (the differences between 2014 and 2000 were 0.4 and 0.18 respectively). Calculations of Williamson's coefficient were relatively stable in Estonia and Latvia during the analyzed period (differences were 0.04 and 0.01 respectively).

The analysis of the relationship between the growth of national economies and the regional inequalities was conducted on the basis of scattered diagrams. It allowed for the identification of three groups of countries.

The first group comprised countries where analogous relations to those described by Williamson's inverse U hypothesis were clearly visible, i.e. the Czech Republic, Slovenia, Slovakia, and Hungary. In the initial phase of the analysis, there was an increase in regional disparities, followed by a phase of stabilization, then followed by the stage of reduction of the inequality level (see Figure 5).

The second group covered the countries where a stable growing trend in regional disparities prevailed. The divergence of regional inequalities was evident among underdeveloped countries (Bulgaria, Romania, Croatia), and in Poland. It seemed that these countries had not yet reached the growth level high enough to exceed the threshold where the convergence processes were triggered (see Figure 6).

The last group included the Baltic States — Estonia, Latvia and Lithuania. In these countries, continuing economic growth was not accompanied by changes in regional disparities. The differences between V_W values in subsequent years were so small that it was difficult to determine the relationship in terms of regional convergence or divergence (see Figure 7).

The estimation of the parabolic econometric models confirmed by earlier observations are shown in Table 2. All analyzed countries except the Baltic States (Lithuania, Latvia and Estonia), were well-suited for the empirical data (they explained regional variation, regarding from 67% in Hungary to 92% in Bulgaria) and showed statistical significance of the set of regression coefficients (statistically significant F values). Furthermore, most estimates of b_2 parameter (determining the shape of parabola) were

negative (except for Romania). Thus, it can be stated that the internal diversity of GDP per capita in most of the analyzed countries could be described by the inverse U-curve.

However, the statistical insignificance of the estimated parameters in most models negatively affected the inference process. Only the estimated parameters of the regression function for the Czech Republic, Slovakia, Slovenia and Hungary were considered statistically significant (at assumed significance levels from 0.1 to 0.01). In other cases, the probability of error in the process of parameter estimation often exceeded 20%, and in extreme cases reached 90%. It means that in the case of countries included in this analysis, the postulated relationship should not have been described by a quadratic function, and therefore the Williamson's hypothesis could not be validated.

Conclusions

In the light of the research findings, it was stated that in the analyzed group of countries both convergence symptoms (reflected in moving of national economies toward each other), and divergent tendencies (reflected in the increase of economic diversification at the NUTS 3 level) were observed. Analyses at the CEE intrastate level showed that while there was conspicuous external convergence (catching-up with the EU–15 average by the state economies), there was also growing economic diversification between regions in the studied countries (internal divergence). Similar results were achieved by Kuc (2017) who studied convergence and divergence trends in Visegrad Group countries, Lukovics (2008) who focused on Hungarian subregions, Szörfi (2007) who addressed selected old and new EU member states, and Forster *et al.* (2005), who based their analysis on four Eastern European countries: the Czech Republic, Hungary, Poland, and Russia. The latter authors stated that the vast majority of the inequality was caused by intraregional rather than interregional variation.

Comparable evolutions had also been found previously for a number of new EU member states in a report by the European Commission (2004). This report in particular showed that regional inequalities tended to rise in countries such as the Czech Republic, Hungary, Poland, and Slovakia starting from 1995 as a consequence of a fast national catching-up in the economic growth.

The research findings have important policy and practice implications. The problem addressed in the paper is connected to EU regional policy aimed at guaranteeing economic and social cohesion within the Community

by reducing spatial imbalances. Pursuing cohesion policy by definition should lead to obtaining convergence, and the role of its institutions is to provide for such distribution of European funds to secure equalization of profound differences in growth with respect to spatial distribution (Barca, 2009; Gorzelak, 2010; Churski & Hauke, 2012). However, it is not stipulated clearly in the Treaty at which level of territorial organization the inequalities in socioeconomic growth should be rectified — at the state or interregional level (or perhaps even intraregional). This confusion is significant in the context of the new economic geography initiated by Krugman (1991a, 1991b, 1995). In the research papers representing this approach (e.g. Martin & Ottaviano, 2001; Brakman *et al.*, 2005) it is indicated that growing dynamics in a given spatial-economic system entails an increase in discrepancies between its parts (Kisiała *et al.*, 2017).

As it was ascertained that the dependence expressed by Williamson's curve was only revealed at higher stages of economic growth, it might be assumed that the CEE countries in the process of economic integration with the EU were undergoing an analogous path to the one that had been identified before by Williamson and described in the inverse U-shaped curve.

Williamson's hypothesis that explains the level of regional inequalities dependent from economic growth, could not be verified unequivocally in the case of all CEE countries. While the econometric models, estimated at the cross-country level and the ones estimated at the intrastate level in the most developed countries, confirmed the parabolic shape of the relationship studied, the lack of statistical significance of the independent variables in other models indicated a non-parabolic shape of the sought function.

Nevertheless, the high values of the coefficients of determination suggested that attempts to explain the variations of economic inequality observed in the analyzed years by the quadratic function of GDP per capita were justified. The statistical data gathered in subsequent years confirmed the validity of observations that had been made half a century ago.

However, it should be noted that the conducted research covered a limited time-series. Economies react with some delay to growth impulses, and reaching the steady state is a long-term process. Thus it would be interesting to identify and validate long-term tendencies within changes of regional disparities in income. A significant limitation of the analysis is the lack of regional statistics encompassing longer time-series. Another confusing factor that impedes the analysis of CEE economies is the political and economic transformation that most of these countries underwent in late 80s. and early 90s. in the 20th century.

Therefore, further research based on long time-series of statistical data should focus on monitoring whether obtaining a high level of socioeconom-

ic growth is associated with permanent convergent trend in regional systems or it should rather be considered as a phase of a more diverse, wave-like process.

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Annex

Table 1. Gross domestic product per capita and economic disparities on regional (NUTS3) level in CEE countries

Country	GDP per capita (thousand PPS)		GDP per capita (% UE-15)		Change (in pp)	Williamson's coefficient		Change
	2000	2014	2000	2014		2000	2014	
Bulgaria	5.5	12.8	24.0	42.5	18.5	0.43	0.83	0.40
Croatia	9.6	16.1	41.8	53.8	12.0	0.43	0.53	0.09
Czech Republic	14.1	23.8	61.4	79.1	17.7	0.38	0.43	0.05
Estonia	8.4	21.0	36.6	69.8	33.2	0.48	0.52	0.04
Hungary	10.5	18.7	45.7	62.4	16.7	0.59	0.67	0.08
Latvia	7.1	17.5	30.9	58.3	27.5	0.59	0.61	0.01
Lithuania	7.6	20.7	32.9	68.9	36.0	0.37	0.44	0.07
Poland	9.2	18.6	40.1	62.1	22.0	0.52	0.57	0.05
Romania	5.0	15.3	21.6	50.8	29.2	0.53	0.71	0.18
Slovakia	9.7	21.3	42.1	71.0	28.9	0.43	0.52	0.09
Slovenia	15.5	22.8	67.5	75.8	8.3	0.28	0.33	0.06

Source: own elaboration based on Eurostat.

Table 2. The estimation of parabolic regression models: $y_t = b_0 + b_1 x_t + b_2 x_t^2$

Country	Intercept b_0	Coefficient b_1	Coefficient b_2	R^2	F
Bulgaria	-0.23319**	0.13410*	-0.00354	0.92	72.14***
Croatia	0.1796	0.02947	-0.0005	0.72	15.61***
Czech Republic	-0.51514***	0.09681***	-0.00240***	0.87	40.80***
Estonia	0.42670***	0.01221	-0.00041	0.06	0.41
Hungary	-0.26524	0.11249**	-0.00322*	0.67	12.28***
Latvia	0.59799***	0.00298	-0.00023	0.06	0.36
Lithuania	0.33176***	0.01084	-0.00032	0.1	0.64
Poland	0.40457***	0.01378	-0.00025	0.88	46.13***
Romania	0.35921***	0.02363	0.00001	0.87	38.94***
Slovakia	0.17364*	0.03337**	-0.00081*	0.83	30.10***
Slovenia	-0.69198***	0.09796***	-0.00230***	0.89	48.97***

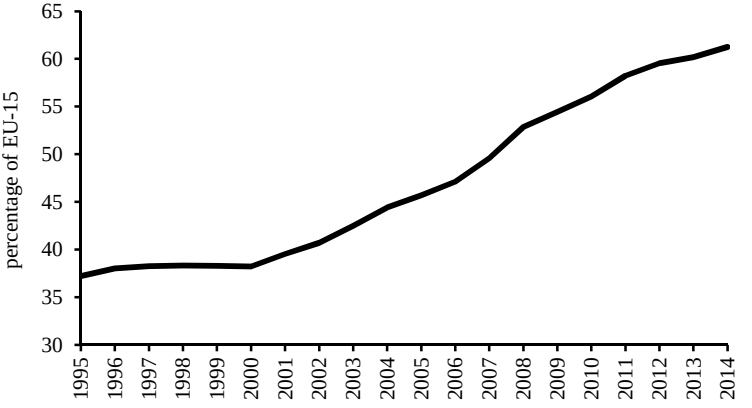
Level of statistical significance: ***α=0.01, **α=0.05, *α=0.1

Source: own elaboration based on Eurostat.

Figure 1. Graphic representation of Williamson's hypothesis with an inverse U-shape curve

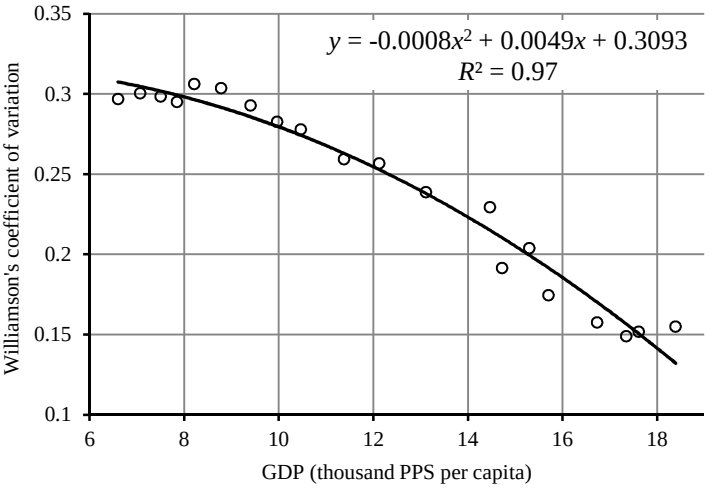
Source: own elaboration based on Williamson (1965), Coates *et al.* (1979) and Szörfi (2007).

Figure 2. Dynamics of the economic growth in CEE countries (PPS per inhabitant in percentage of the EU–15 average)



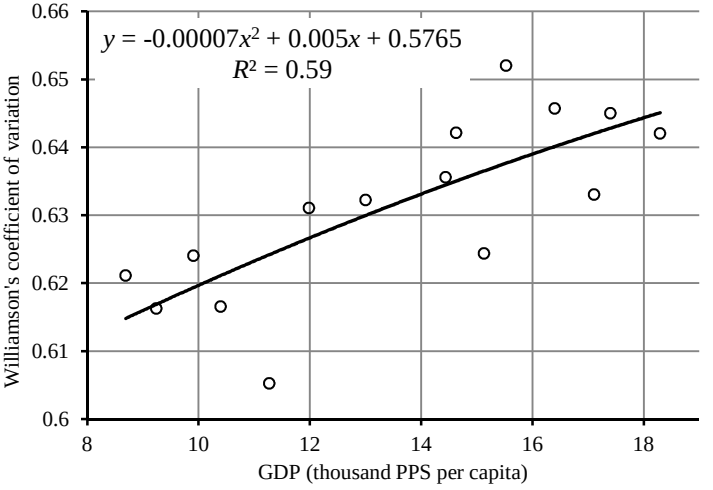
Source: own elaboration based on Eurostat.

Figure 3. Relation between economic growth and inequalities in CEE countries



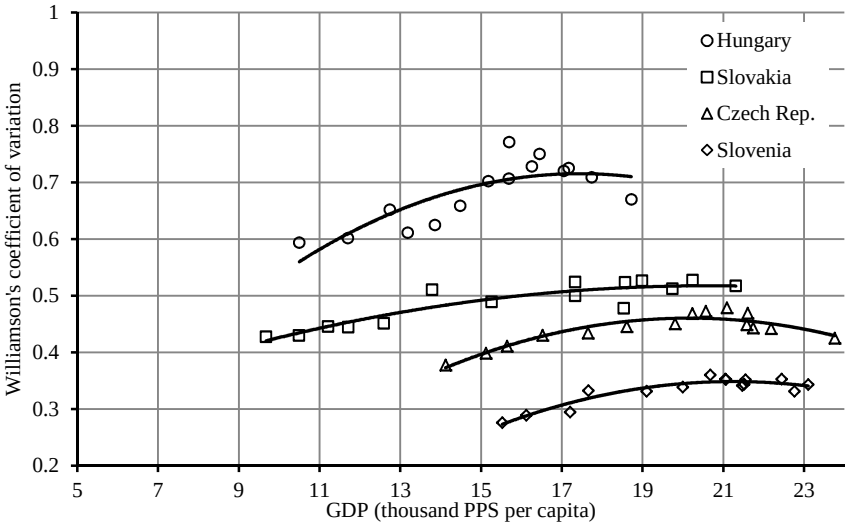
Source: own elaboration based on Eurostat.

Figure 4. Relation between economic growth and regional inequalities in CEE countries (at the NUTS 3 level)



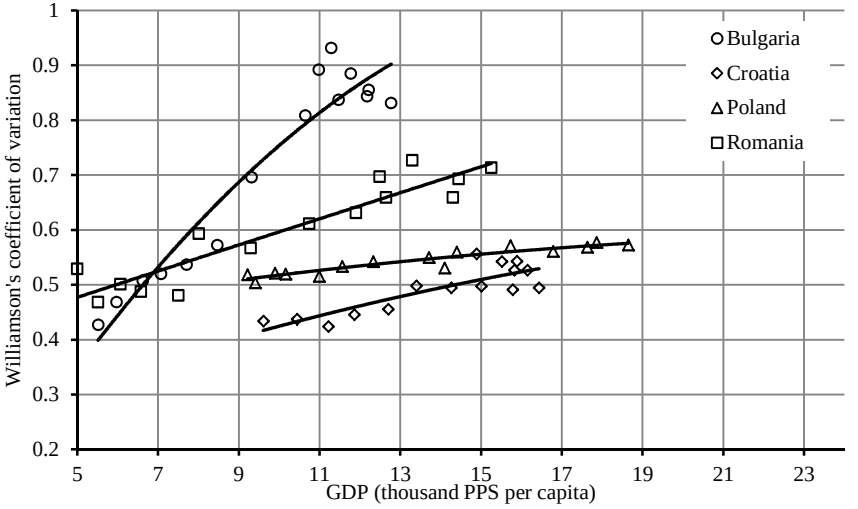
Source: own elaboration based on Eurostat.

Figure 5. Relationship between economic growth and regional inequalities in the first group of CEE countries (intra-country evidence at the NUTS 3 level)



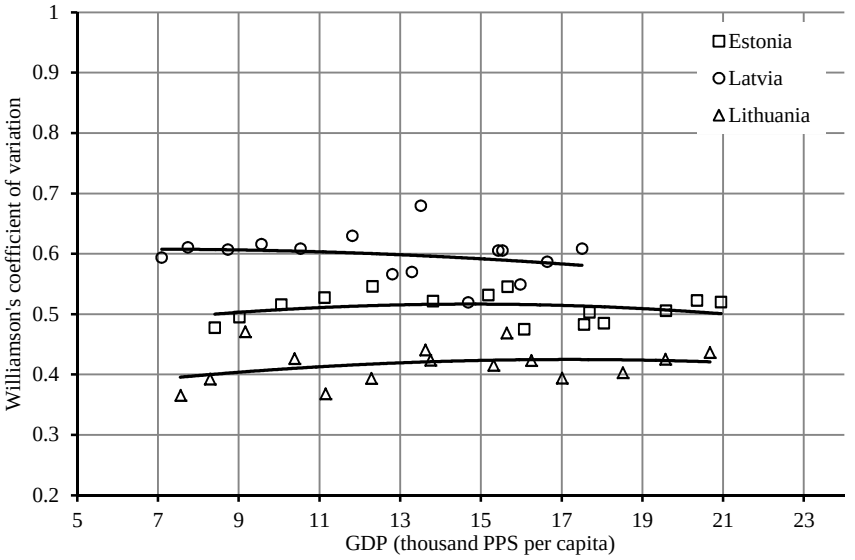
Source: own elaboration based on Eurostat.

Figure 6. Relationship between economic growth and regional inequalities in the second group of CEE countries (intra-country evidence at the NUTS 3 level)



Source: own elaboration based on Eurostat.

Figure 7. Relationship between economic growth and regional inequalities in the third group of CEE countries (intra-country evidence at the NUTS 3 level)



Source: own elaboration based on Eurostat.